

Docket No. 2001-020-TAP

**CLAIMS:**

What is claimed is:

- 1 1. A reduced sensitivity spin valve sensor apparatus,  
2 comprising:  
3 at least one fixed layer; and  
4 at least one free layer, wherein the flux carrying  
5 capacity of the spin valve sensor is increased above  
6 standard spin valve sensors, to reduce the sensitivity of  
7 the spin valve sensor.
- 1 2. The reduced sensitivity spin valve sensor apparatus  
2 of claim 1, wherein the flux carrying capacity of the  
3 spin valve sensor is increased by increasing a thickness  
4 of the at least one free layer above 60 angstroms.
- 1 3. The reduced sensitivity spin valve sensor apparatus  
2 of claim 2, wherein the thickness of the at least one  
3 free layer is between 90 and 120 angstroms, inclusively.
- 1 4. The reduced sensitivity spin valve sensor apparatus  
2 of claim 1, wherein the flux carrying capacity of the  
3 spin valve sensor is increased above standard spin valve  
4 sensors such that an amount by which a free layer moment  
5 rotates for a given flux input is decreased.
- 1 5. A reduced sensitivity spin valve sensor apparatus,  
2 comprising:  
3 at least one fixed layer; and  
4 at least two free layers.

1 6. The reduced sensitivity spin valve sensor apparatus  
2 of claim 5, further comprising at least one non-magnetic  
3 spacer positioned between the at least one fixed layer  
4 and one of the at least two free layers.

1 7. The reduced sensitivity spin valve sensor apparatus  
2 of claim 5, wherein the at least one fixed layer includes  
3 at least two fixed layers having a magnetic orientation  
4 approximately 90 degrees from a magnetic orientation of  
5 the at least two free layers.

1 8. The reduced sensitivity spin valve sensor apparatus  
2 of claim 5, wherein the at least one fixed layer includes  
3 at least two fixed layers, and wherein the at least two  
4 free layers are positioned between the at least two fixed  
5 layers.

1 9. The reduced sensitivity spin valve sensor apparatus  
2 of claim 8, wherein the at least two fixed layers and the  
3 at least two free layers are spaced from one another by  
4 three non-magnetic spacers.

1 10. The reduced sensitivity spin valve sensor apparatus  
2 of claim 5, wherein a magnetic flux is distributed across  
3 the two free layers to thereby reduce a magnetic flux fed  
4 to each free layer.

Docket No. 2001-020-TAP

1 11. A method of making a reduced sensitivity spin valve  
2 sensor apparatus, comprising:  
3 providing at least one fixed layer; and  
4 providing at least one free layer, wherein the flux  
5 carrying capacity of the spin valve sensor is increased  
6 above standard spin valve sensors, to reduce the  
7 sensitivity of the spin valve sensor.

1 12. The method of making a reduced sensitivity spin  
2 valve sensor apparatus of claim 1, wherein the flux  
3 carrying capacity of the spin valve sensor is increased  
4 by increasing a thickness of the at least one free layer  
5 above 60 angstroms.

1 13. The method of making a reduced sensitivity spin  
2 valve sensor apparatus of claim 12, wherein the thickness  
3 of the at least one free layer is between 90 and 120  
4 angstroms, inclusively.

1 14. The method of making a reduced sensitivity spin  
2 valve sensor apparatus of claim 11, wherein the flux  
3 carrying capacity of the spin valve sensor is increased  
4 above standard spin valve sensors such that an amount by  
5 which a free layer moment rotates for a given flux input  
6 is decreased.

1 15. A method of making a reduced sensitivity spin valve  
2 sensor apparatus, comprising:  
3 providing at least one fixed layer; and  
4 providing at least two free layers.

Docket No. 2001-020-TAP

1 16. The method of making a reduced sensitivity spin  
2 valve sensor apparatus of claim 15, further comprising  
3 providing at least one non-magnetic spacer positioned  
4 between the at least one fixed layer and one of the at  
5 least two free layers.

1 17. The method of making a reduced sensitivity spin  
2 valve sensor apparatus of claim 15, wherein providing the  
3 at least one fixed layer includes providing at least two  
4 fixed layers having a magnetic orientation approximately  
5 90 degrees from a magnetic orientation of the at least  
6 two free layers.

1 18. The method of making a reduced sensitivity spin  
2 valve sensor apparatus of claim 15, wherein providing the  
3 at least one fixed layer includes providing at least two  
4 fixed layers, and wherein providing the at least two free  
5 layers includes positioning the at least two free layers  
6 between the at least two fixed layers.

1 19. The method of making a reduced sensitivity spin  
2 valve sensor apparatus of claim 18, wherein providing the  
3 at least two fixed layers and providing the at least two  
4 free layers includes spacing the at least two fixed  
5 layers and at least two free layers from one another by  
6 three non-magnetic spacers.

2001-020-TAP

Docket No. 2001-020-TAP

- 1 20. The method of making a reduced sensitivity spin
- 2 valve sensor apparatus of claim 15, wherein a magnetic
- 3 flux is distributed across the two free layers to thereby
- 4 reduce a magnetic flux fed to each free layer.

2001-020-TAP